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SERVICE MANUAL

308E MINI HYD EXCAVATOR

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Heavy Equipment Manuals

Product: MINI HYD EXCAVATOR
Model: 308E MINI HYD EXCAVATOR GBJ
Configuration: 308E Mini Hydraulic Excavator GBJ00001-UP (MACHINE) POWERED BY C3.3B Engine

Disassembly and Assembly
C2.6 and C3.3B
Engines for Caterpillar Built Machines
Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05244466

Alternator - Remove and Install

SMCS - 1405-010

S/N - A9W1-UP

S/N - A9Z1-UP

S/N - CE21-UP

S/N - DML1-UP

S/N - EML1-UP

S/N - F8C1-UP

S/N - FHL1-UP

S/N - FMR1-UP

S/N - FTK1-UP

S/N - GBJ1-UP

S/N - GTK1-UP

S/N - H1Y1-UP

S/N - HAM1-UP

S/N - HEL1-UP

S/N - HMR1-UP

S/N - JBE1-UP

S/N - JRD1-UP

S/N - JRF1-UP

S/N - JRS1-UP

S/N - JSL1-UP

S/N - JSN1-UP

S/N - KTS1-UP

S/N - L661-UP

S/N - L771-UP

S/N - L881-UP

S/N - LST1-UP

S/N - MLT1-UP

S/N - MPW1-UP

S/N - NTL1-UP

S/N - PPT1-UP

S/N - RCX1-UP

S/N - SEN1-UP

S/N - STK1-UP

S/N - TAZ1-UP

S/N - TLK1-UP

S/N - WCT1-UP

Removal Procedure

Start By:

A. Remove V belt.

1. Turn the battery disconnect to the OFF position.

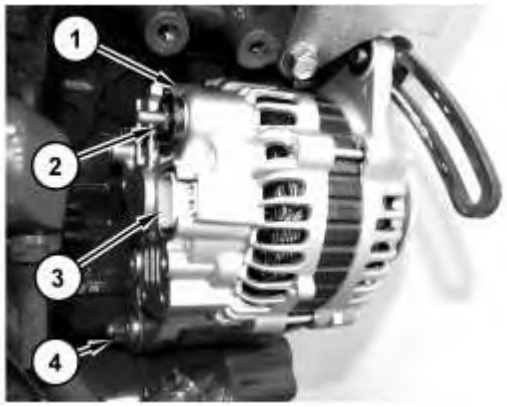

Illustration 1 g02798717

2. Disconnect harness assemblies (2) and (3) from alternator (1) .
3. Remove nut (4) .

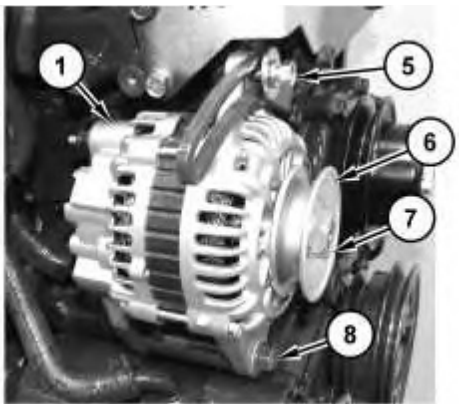

Illustration 2 g02798718

4. Remove nut (7) and pulley (6) .
5. Remove bolts (5) and (6) .
6. Remove alternator (1) .

Installation Procedure

1. Install alternator (1) in the reverse order of removal.

a. Ensure pulley (6) is correctly oriented.

b. Tighten nut (7) to a torque of 58 to 79 N·m (43 to 58 lb ft).

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Configuration: 308E Mini Hydraulic Excavator GBJ00001-UP (MACHINE) POWERED BY C3.3B Engine

Disassembly and Assembly
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Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242994

Bearing Clearance - Check

SMCS - 1203-535; 1219-535

Measurement Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	198-9142	Plastic Gauge (Green) 0.025 to 0.076 mm (0.001 to 0.003 inch)	1
	198-9143	Plastic Gauge (Red) 0.051 to 0.152 mm (0.002 to 0.006 inch)	1
	198-9144	Plastic Gauge (Blue) 0.102 to 0.229 mm (0.004 to 0.009 inch)	1
	198-9145	Plastic Gauge (Yellow) 0.230 to 0.510 mm (0.009 to 0.020 inch)	1

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

Note: Plastic gauge may not be necessary when the engine is in the chassis.

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NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Note: Caterpillar does not recommend the checking of the actual bearing clearances particularly on small engines. The checking can result in the possibility of obtaining inaccurate information and the possibility of damaging the bearing or the journal surfaces. Each Caterpillar engine bearing is quality checked for specific wall thickness.

Note: The measurements should be within specifications and the correct bearings should be used. If the crankshaft journals and the bores for the block and the rods were measured during disassembly, no further checks are necessary. However, if the technician still wants to measure the bearing clearances, Tooling (A) is an acceptable method. Tooling (A) is less accurate on journals with small diameters if clearances are less than 0.10 mm (0.004 inch).

NOTICE

Lead wire, shim stock or a dial bore gauge can damage the bearing surfaces.

The technician must be careful to use Tooling (A) correctly. The following points must be remembered:

- Ensure that the backs of the bearings and the bores are clean and dry.
- Ensure that the bearing locking tabs are properly seated in the tab grooves.
- The crankshaft must be free of oil at the contact points of Tooling (A).

1. Put a piece of Tooling (A) on the crown of the bearing that is in the cap.

   Note: Do not allow Tooling (A) to extend over the edge of the bearing.

2. Use the correct torque-turn specifications in order to install the bearing cap. Do not use an impact wrench. Be careful not to dislodge the bearing when the cap is installed.

   Note: Do not turn the crankshaft when Tooling (A) is installed.

3. Carefully remove the cap, but do not remove Tooling (A). Measure the width of Tooling (A) while Tooling (A) is in the bearing cap or on the crankshaft journal. Refer to Illustration 1.

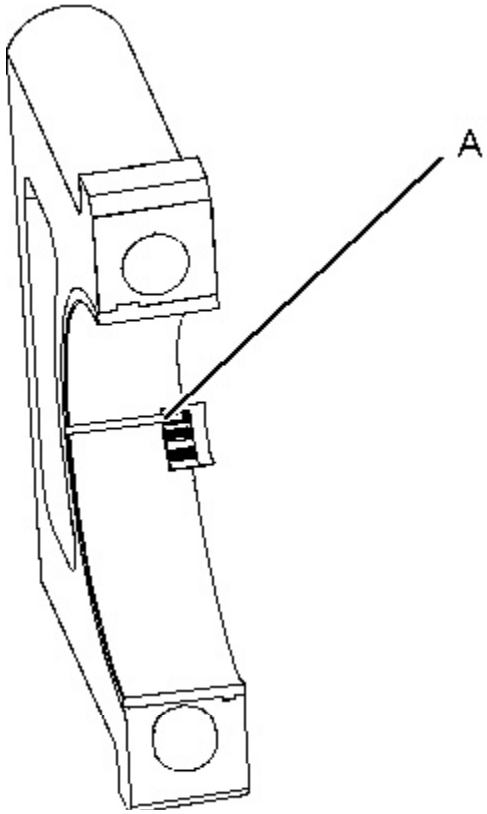

Illustration 1 g01152855

Typical Example

4. Remove all of Tooling (A) before you install the bearing cap.

   Note: When Tooling (A) is used, the readings can sometimes be unclear. For example, all parts of Tooling (A) are not the same width. Measure the major width in order to ensure that the parts are within the specification range. Refer to Specifications Manual, "Connecting Rod Bearing Journal" and Specifications Manual, "Main Bearing Journal" for the correct clearances.

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Configuration: 308E Mini Hydraulic Excavator GBJ00001-UP (MACHINE) POWERED BY C3.3B Engine

Disassembly and Assembly
C2.6 and C3.3B
Engines for Caterpillar Built Machines

Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242591

Bridge Dowels - Remove and Install - C3.3B

SMCS - 1100-010

S/N - A9W1-UP

S/N - A9Z1-UP

S/N - CE21-UP

S/N - DML1-UP

S/N - EML1-UP

S/N - F8C1-UP

S/N - FMR1-UP

S/N - FTK1-UP

S/N - GBJ1-UP

S/N - GTK1-UP

S/N - HAM1-UP

S/N - HEL1-UP

S/N - HMR1-UP

S/N - JBE1-UP

S/N - JRD1-UP

S/N - JRF1-UP

S/N - JRS1-UP

S/N - JSL1-UP

S/N - JSN1-UP

S/N - KTS1-UP

S/N - L661-UP

S/N - L771-UP

S/N - L881-UP

S/N - LST1-UP

S/N - MLT1-UP

S/N - MPW1-UP

S/N - NTL1-UP

S/N - PPT1-UP

S/N - RCX1-UP

S/N - SEN1-UP

S/N - STK1-UP

S/N - TAZ1-UP

S/N - TLK1-UP

S/N - WCT1-UP

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	5P-0944	Dowel Puller Gp	1

Start By:

A. Remove valve springs of bridge dowel being repaired.

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

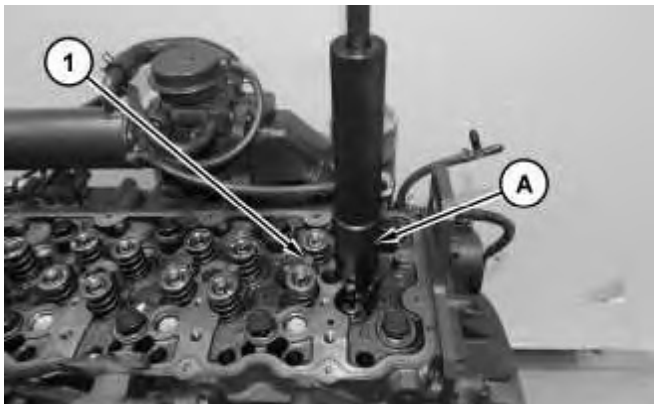

Illustration 1 g02882621

1. Install Tooling (A) and remove bridge dowel (1) .

Installation Procedure

Table 2

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
B	390-1142	Spacer	1

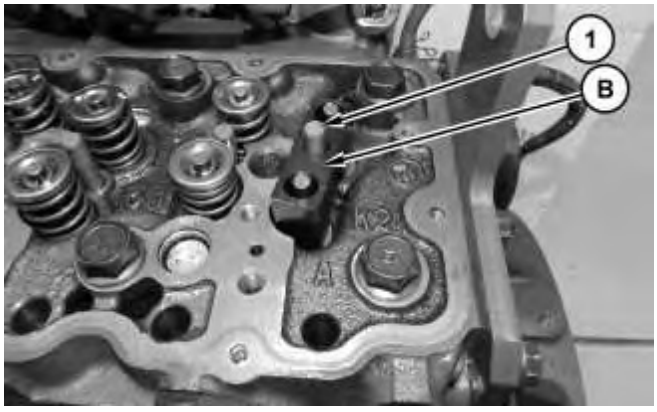

Illustration 2 g02882716

Illustration 3 g02882838

1. Use a press or hammer to drive bridge dowel (1) to a height that is flush with Tooling (B) .

End By: Install valve springs of bridge dowel being repaired.

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C2.6 and C3.3B
Engines for Caterpillar Built Machines

Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242925

Camshaft and Valve Lifters - Remove and Install - C3.3B

SMCS - 1209-010; 1210-010

S/N - A9W1-UP

S/N - A9Z1-UP

S/N - CE21-UP

S/N - DML1-UP

S/N - EML1-UP

S/N - F8C1-UP

S/N - FMR1-UP

S/N - FTK1-UP

S/N - GBJ1-UP

S/N - GTK1-UP

S/N - HAM1-UP

S/N - HEL1-UP

S/N - HMR1-UP

S/N - JBE1-UP

S/N - JRD1-UP

S/N - JRF1-UP

S/N - JRS1-UP

S/N - JSL1-UP

S/N - JSN1-UP

S/N - KTS1-UP

S/N - L661-UP

S/N - L771-UP

S/N - L881-UP

S/N - LST1-UP

S/N - MLT1-UP

S/N - MPW1-UP

S/N - NTL1-UP

S/N - PPT1-UP

S/N - RCX1-UP

S/N - SEN1-UP

S/N - STK1-UP

S/N - TAZ1-UP

S/N - TLK1-UP

S/N - WCT1-UP

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	-	Magnets	8

B	390-1149	Driver	1

Start By:

A. Remove the rocker shaft and pushrods.
B. Remove the flywheel housing.
C. Remove the oil pan. (Only necessary if valve lifters will be removed.)

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

Illustration 1 g02795978

1. Ensure that Timing Marks (Y) on the idler gear and the camshaft gear are aligned. Refer to illustration 1.

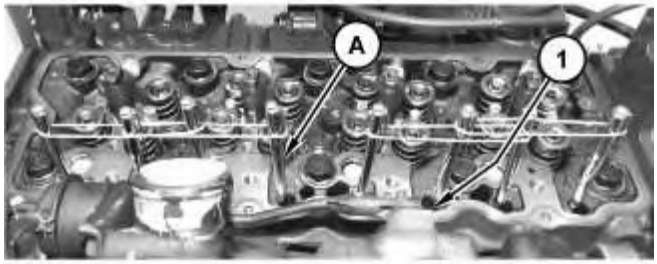

Illustration 2 g02798975

2. Use Tooling (A) to hold up the valve lifters (1) in order to remove the camshaft.

Illustration 3 g02796757

NOTICE

Do not damage the lobes or the bearings when the camshaft is removed or installed.

3. Remove bolts (3) .
4. Carefully remove camshaft (2) from the cylinder block.
5. Remove Tooling (A) . Use a suitable container to catch the valve lifters (1) as the valve lifters (1) slide out the bottom of the cylinder block.

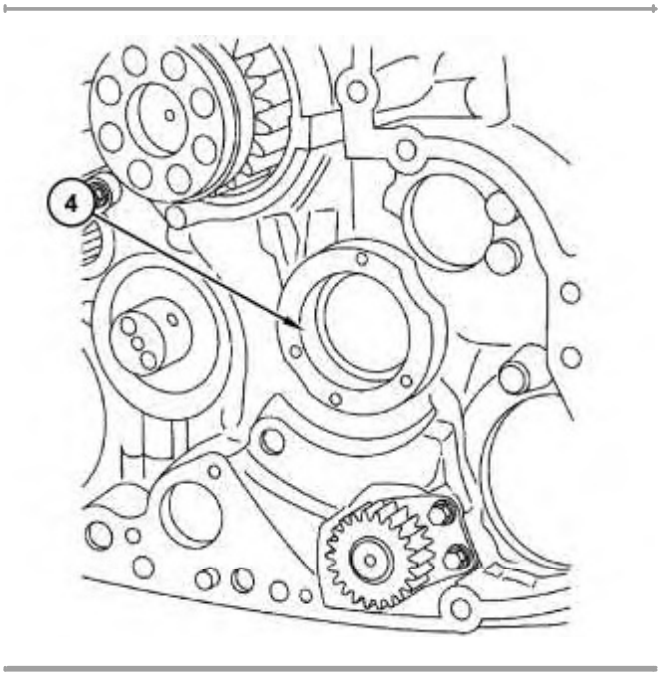

Illustration 4 g02880896

6. Remove the camshaft cover (4) .

Installation Procedure

1. Install camshaft (1) in the reverse order of removal.

Illustration 5 g02881018

a. Place camshaft cover (4) on Tooling (B) .

Illustration 6 g02881076

b. Use Tooling (B) to install the camshaft cover (4) .

c. Tighten bolts (3) to a torque of 24.0 ± 27.0 N·m (17.70 ± 19.91 lb ft).

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Disassembly and Assembly
C2.6 and C3.3B
Engines for Caterpillar Built Machines

Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242932

Camshaft Gear - Remove and Install

SMCS - 1210-010-GE

Removal Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	1P-0510	Driver Group	1
B	8B-7551	Puller Assembly	1
C	8H-0663	Bearing Puller	1

Start By:

A. Remove the camshaft.

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Dispose of all fluids according to local regulations and mandates.

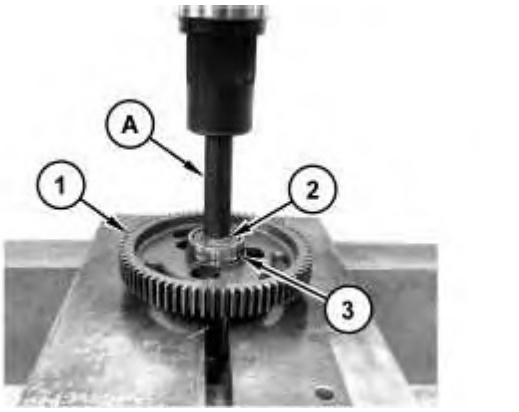

Illustration 1 g02796778

1. Use Tooling (A) in order to remove camshaft gear (1) from camshaft (2) .
2. If necessary, apply heat to raise the temperature of the race (3) of the roller bearing to remove.

Illustration 2 g02796779

3. Remove plate (5) from camshaft (2) .
4. If necessary, remove the key (4) from the nose of camshaft (2) .

Installation Procedure

1. Install camshaft gear (1) in the reverse order of removal.

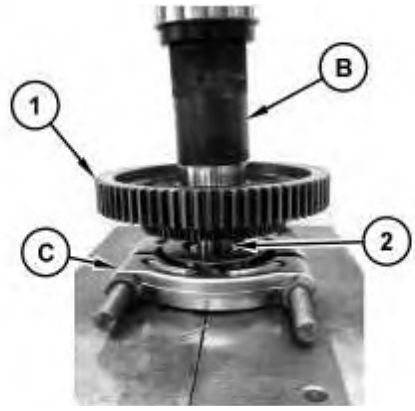

Illustration 3 g02807848

a. Use Tooling (B) and Tooling (C) in order to install camshaft gear (1) onto camshaft (2) .

b. Ensure that the camshaft gear and the key are clean and free from wear and damage.

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i06892088

Connecting Rod Bearings - Remove and Install

SMCS - 1219-010

Removal Procedure

Start By:

a. Remove the engine oil pan.

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Discard all used Connecting Rod fasteners.

Note: If all connecting rod bearings require replacement, the procedure can be carried out on two cylinders at the same time. The procedure can be carried out on the following pairs of cylinders. 1 with 4 and 2 with 3.

Ensure that both pairs of the connecting rod bearings are installed before changing from one pair of cylinders to another pair of cylinders. Refer to Disassembly and Assembly, "Connecting Rod Bearings - Install" for the correct procedure.

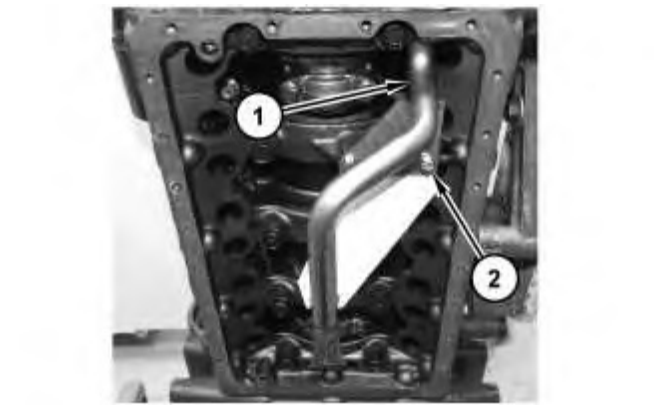

Illustration 1 g02798265

1. Remove bolt (2), the O-ring seal, and oil pump screen (1).

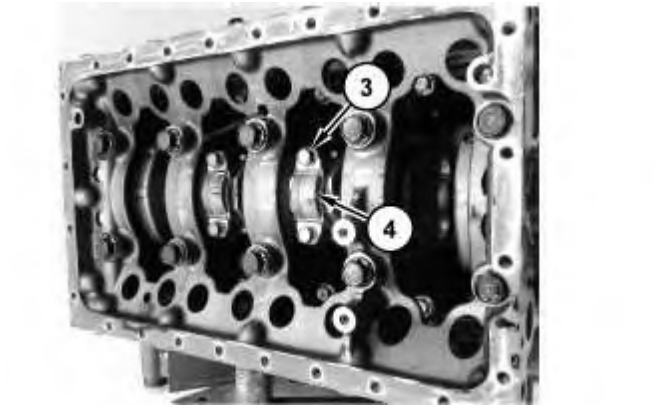

Illustration 2 g02798267

2. The connecting rod and the connecting rod cap should have an etched Number (X) on the side. The number on the connecting rod and the connecting rod cap must match. If necessary, make a temporary mark on the connecting rod and connecting rod cap (4) in order to identify the cylinder number.
3. Remove bolts (3). Remove connecting rod cap (4) from the connecting rod.

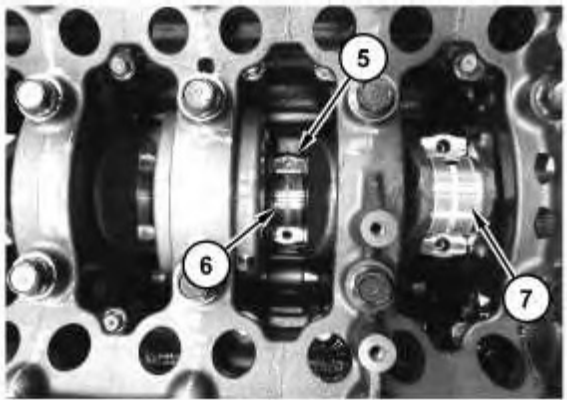

Illustration 3 g02798268

4. Carefully push connecting rod (5) into the cylinder bore until connecting rod (5) is clear of the crankshaft. Remove lower bearing shell (7) and then remove upper bearing shell (6) from connecting rod (5). Keep the bearing shells together.

5. Repeat Step 3 through Step 4 for the remaining bearing shells.

Installation Procedure

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

NOTICE

Discard all used Connecting Rod fasteners.

1. Ensure that the bearing shells are clean and free from wear and damage. If necessary, replace the bearing shells.

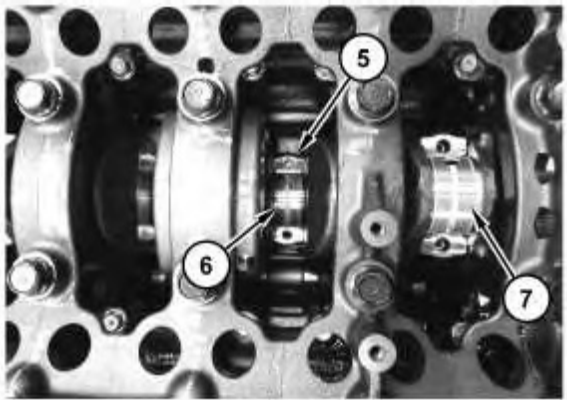

Illustration 4 g02798268

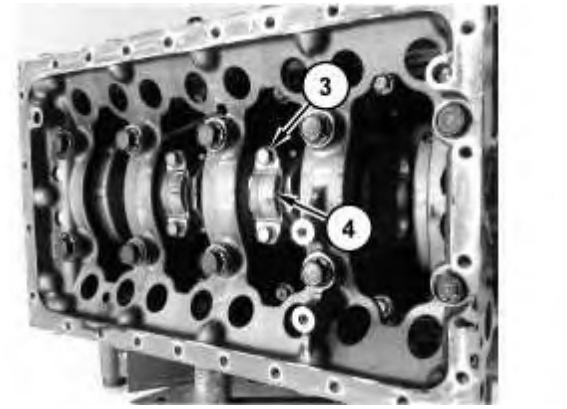

Illustration 5 g02798267

Note: Connecting rods and bearing are marked with color codes. The color codes are blue and unmarked. The bearings must match up with the corresponding connecting rods. It is possible to have different color codes in the same engine.

2. Install upper bearing shell (6) into connecting rod (5). Ensure that the locating tab for the upper bearing shell is correctly seated in the slot in connecting rod (5).

   Note: The ends of the upper bearing shell must be centered in the connecting rod. The ends of the upper bearing shell are to be positioned equally in relation to the mating faces of the connecting rod.

3. Lubricate upper bearing shell (6) with clean engine oil.

4. Carefully pull connecting rod (5) against the crankshaft.

5. Clean connecting rod cap (4). Install lower bearing shell (7) into connecting rod cap (4). Ensure that the locating tab for lower bearing shell (7) is correctly seated in the slot in connecting rod cap (4).

6. Lubricate the crankshaft and lubricate lower bearing shell (7) with clean engine oil.

7. Install connecting rod cap (4) to the connecting rod.

Note: Ensure that etched Number on connecting rod cap (4) matches etched Number on the connecting rod. Ensure the correct orientation of the connecting rod cap. The locating tab for the upper bearing shell and the lower bearing shell should be on the same side.

8. For the C3.3B install new bolts (3) to the connecting rod. Apply clean engine oil to the threads of bolts. Tighten the bolts evenly to a torque of 69 to 73 N·m (51 to 54 lb ft).

9. For the C2.6 install new bolts (3) to the connecting rod. Apply clean engine oil to the threads of bolts. Tighten the bolts evenly to a torque of 45 to 49 N·m (33 to 36 lb ft).

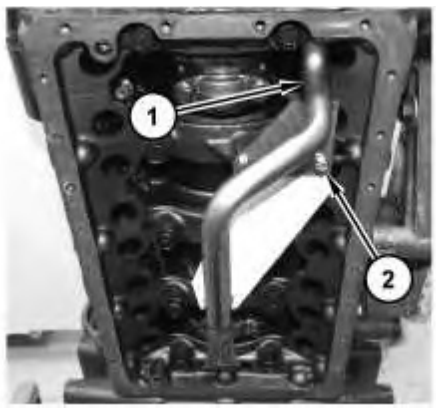

Illustration 6 g02798265

10. Position engine oil screen (1) and install the O-ring seal and bolt (2).

11. Repeat Step 2 through Step 8 for the remaining connecting rod bearings.

Note: If all connecting rod bearings require replacement, the procedure can be carried out on two cylinders at the same time. The procedure can be carried out on the following pairs of cylinders. 1 with 4 and 2 with 3. Ensure that both pairs of the connecting rod bearings are installed before changing from one pair of cylinders to another pair of cylinders. Refer to Disassembly and Assembly, "Connecting Rod Bearings - Install" for the correct procedure.

End By:

a. Install the engine oil pan.

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Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242559

Crankshaft Front Seal - Remove and Install

SMCS - 1160-010

Removal Procedure

Start By:

A. Remove the crankshaft pulley.

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

NOTICE

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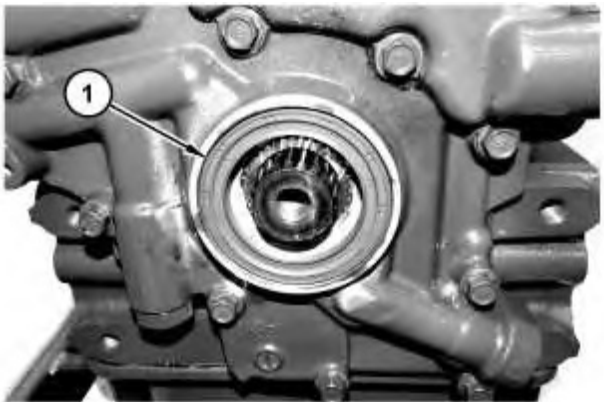

Illustration 1 g02795123

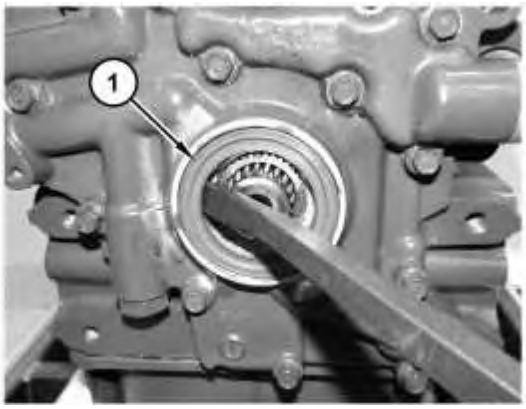

Illustration 2 g02795124

1. Use a suitable pry bar to remove crankshaft front seal (1) .

Installation Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	390-1140	Driver	1
B	6V-6640	Sealant	1

Note: The crankshaft front seal should be installed dry. Lubricate the inner rubber portion of the crankshaft front seal.

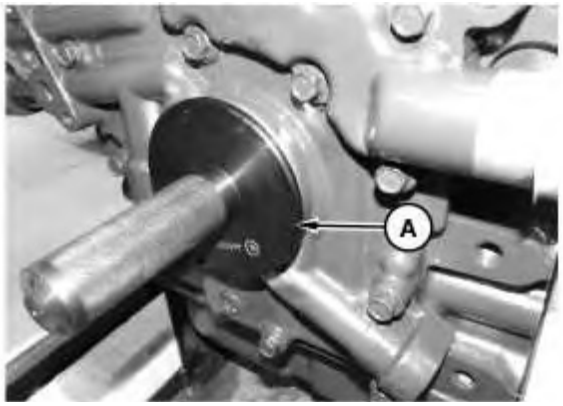

Illustration 3 g02796112

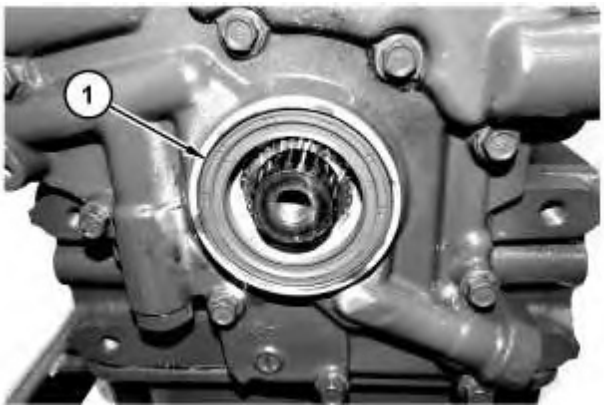

Illustration 4 g02795123

1. Lubricate the inner rubber portion of crankshaft front seal (1) . Apply Tooling (B) on crankshaft front seal (1) . Position crankshaft front seal (1) on Tooling (A) . Install crankshaft front seal (1) on the crankshaft.

End By: Install the crankshaft pulley.

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Product: MINI HYD EXCAVATOR
Model: 308E MINI HYD EXCAVATOR GBJ
Configuration: 308E Mini Hydraulic Excavator GBJ00001-UP (MACHINE) POWERED BY C3.3B Engine

Disassembly and Assembly
C2.6 and C3.3B
Engines for Caterpillar Built Machines

Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242553

Crankshaft Pulley - Remove and Install

SMCS - 1205-010

Removal Procedure

Start By:

A. Remove the v-belt.

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

NOTICE

Keep all parts clean from contaminants.

Contaminants may cause rapid wear and shortened component life.

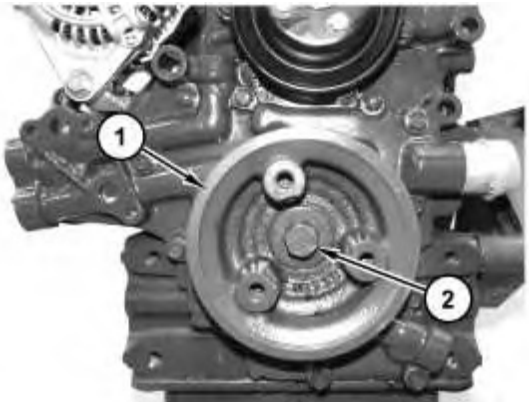

Illustration 1 g02795206

1. Use a suitable tool in order to prevent the crankshaft from rotating. Remove bolt (2) in order to remove crankshaft pulley (1) .

Installation Procedure

1. Install crankshaft pulley (1) in the reverse order of removal.
    a. Apply clean engine oil to the threads of bolt (2) . Tighten bolt (2) to a torque of 255 to 274 N·m (188 to 202 lb ft).

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Product: MINI HYD EXCAVATOR
Model: 308E MINI HYD EXCAVATOR GBJ
Configuration: 308E Mini Hydraulic Excavator GBJ00001-UP (MACHINE) POWERED BY C3.3B Engine

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Media Number -UENR0137-09 **Publication Date -01/08/2015** **Date Updated -14/08/2015**

i05242547

Crankshaft Rear Seal and Wear Sleeve - Install - Includes Crankshaft Gear

SMCS - 1161-012; 7558-012

Installation Procedure

Table 1

Required Tools			
Tool	**Part Number**	**Part Description**	**Qty**
A	390-1146	Crankshaft Rear Seal and Wear Sleeve Driver (1)	1
	423-9665	Crank shaft Rear Seal and Wear Sleeve Driver (2)	1

(1) Used for the C3.3B

(2) Used for the C2.6

Note: Refer to Specification UENR0995 "Engine Design" for non-specified engine Torque Values.

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